

IN THE CLAIMS

Please cancel claims 2, 5, 8, 9, 18, 19, 24, 27, 30 and 31, without prejudice or disclaimer, amend claims 1, 3, 4, 6 thru 10, 12 thru 23, 25, 26 and 28 thru 34, and add claims 35 thru 46, as follows:

1 1. (Currently Once Amended) A cathode for an electron tube, comprising:
2 a metal base; and
3 an electron-emitting material layer coated on the metal base, said electron-
4 emitting material layer comprising a needle-shaped conductive material;
5 said needle-shaped conductive material being at least one material selected from a
6 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,
7 molybdenum and platinum.

Claim 2. (Canceled)

1 3. (Currently Once Amended) The cathode of claim 1, ~~further comprised of~~ said
2 needle-shaped conductive material being a carbonaceous material.

1 4. (Currently Once Amended) ~~[[The]] A cathode of claim 3, further comprised of~~
2 for an electron tube, comprising:
3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-
5 emitting material layer comprising a needle-shaped conductive material;

6 said needle-shaped conductive material being a carbonaceous material [[being]]
7 selected from the group consisting essentially of a carbon nanotube, carbon fiber and
8 graphite fiber.

1 5. (Currently Once Amended) The cathode of claim 3, ~~further comprised of~~ said
2 carbonaceous material being a carbon nanotube.

1 6. (Currently Once Amended) [[The]] ~~A cathode of claim 1, further comprised of~~
2 for an electron tube, comprising:

3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-
5 emitting material layer comprising a needle-shaped conductive material;

6 said needle-shaped conductive material in the electron-emitting material layer
7 being in [[the]] a range of 0.01 to 30% by weight based on [[the]] a total weight of said
8 electron-emitting material.

1 7. (Currently Once Amended) The cathode of claim 1, ~~further comprised of~~ said
2 needle-shaped conductive material being a carbonaceous material, said needle-shaped
3 conductive material being in [[the]] a range of 0.01 to 30% by weight based on [[the]] a

4 total weight of said electron-emitting material layer, and ~~[[the]]~~ a thickness of said
5 electron-emitting material layer being in ~~[[the]]~~ a range of 30 to 80 μm .

Claims 8 and 9. (Canceled)

1 10. (Currently Once Amended) A cathode for an electron tube, comprising:

2 a metal base; and

3 an electron-emitting material layer coated on the metal base, said electron-
4 emitting material layer comprising a needle-shaped conductive material and having a
5 surface roughness corresponding to a distance between ~~[[the]]~~ a highest point and ~~[[the]]~~
6 a lowest point on ~~[[the]]~~ a surface of the electron-emitting material layer being less than
7 10 microns.

1 11. (Original) The cathode of claim 10, wherein said cathode is an oxide cathode.

1 12. (Currently Once Amended) The cathode of claim ~~[[11]]~~ 10, ~~further comprised~~
2 of said needle-shaped conductive material being at least one material selected from the
3 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,
4 molybdenum and platinum.

1 13. (Currently Once Amended) The cathode of claim ~~[[11]]~~ 10, ~~further comprised~~

2 of said needle-shaped conductive material being a carbonaceous material.

1 14. (Currently Once Amended) The cathode of claim 13, ~~further comprised of~~
2 said carbonaceous material being selected from the group consisting essentially of a
carbon nanotube, carbon fiber and graphite fiber.

1 15. (Currently Once Amended) The cathode of claim 13, ~~further comprised of~~
2 said carbonaceous material being a carbon nanotube.

1 16. (Currently Once Amended) The cathode of claim ~~[[11]] 10~~, ~~further comprised~~
2 of said needle-shaped conductive material in the electron-emitting material layer being in
3 ~~[[the]]~~ a range of 0.01 to 30% by weight based on ~~[[the]]~~ a total weight of said electron-
4 emitting material.

1 17. (Currently Once Amended) The cathode of claim ~~[[11]] 10~~, ~~further comprised~~
2 of said needle-shaped conductive material being a carbonaceous material, said needle-
3 shaped conductive material being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on
4 ~~[[the]]~~ a total weight of said electron-emitting material layer, and the thickness of said
5 electron-emitting material layer being in ~~[[the]]~~ a range of 30 to 80 μm .

Claims 18 and 19. (Canceled)

1 20. (Currently Once Amended) The cathode of claim 11, further comprising a
2 metal layer including nickel grains having sizes smaller than ~~[[the]]~~ sizes of grains in said
3 metal base, said metal layer being formed between said metal base and said electron-
4 emitting material layer.

1 21. (Currently Once Amended) The cathode of claim 20, ~~further comprised of~~
2 said metal layer further including at least one metal selected from the group consisting
3 essentially of aluminum (Al), tungsten (W), tantalum (Ta), chromium (Cr), magnesium
4 (Mg), silicon (Si) and zirconium (Zr).

1 22. (Currently Once Amended) The cathode of claim 20, ~~further comprised of the~~
2 a thickness of said metal layer being in ~~[[the]]~~ a range of 1 to 30 μm .

1 23. (Currently Once Amended) An oxide cathode for an electron tube,
2 comprising:

3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-
5 emitting material layer comprising a needle-shaped conductive material;

6 said needle-shaped conductive material being at least one material selected from a
7 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,

8 molybdenum and platinum

Claim 24. (Canceled)

1 25. (Currently Once Amended) The cathode of claim 23, ~~further comprised of~~
2 said needle-shaped conductive material being a carbonaceous material.

1 26. (Currently Once Amended) ~~[[The]]~~ An oxide cathode of claim 25, further
2 ~~comprised of~~ for an electron tube, comprising:

3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-
5 emitting material layer comprising a needle-shaped conductive material;

6 said carbonaceous material being selected from ~~[[the]]~~ a group consisting
7 essentially of a carbon nanotube, carbon fiber and graphite fiber.

1 27. (Currently Once Amended) The cathode of claim 25, ~~further comprised of~~
2 said carbonaceous material being a carbon nanotube.

1 28. (Currently Once Amended) ~~[[The]]~~ An oxide cathode of claim 23, further
2 ~~comprised of~~ for an electron tube, comprising:

3 a metal base; and

4 an electron-emitting material layer coated on the metal base, said electron-
5 emitting material layer comprising a needle-shaped conductive material;

6 said needle-shaped conductive material in the electron-emitting material layer
7 being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on ~~[[the]]~~ a total weight of said
8 electron-emitting material.

1 29. (Currently Once Amended) The cathode of claim 23, ~~further comprised of~~
2 said needle-shaped conductive material being a carbonaceous material, said needle-
3 shaped conductive material being in ~~[[the]]~~ a range of 0.01 to 30% by weight based on
4 ~~[[the]]~~ a total weight of said electron-emitting material layer, and ~~[[the]]~~ a thickness of
5 said electron-emitting material layer being in ~~[[the]]~~ a range of 30 to 80 μm .

Claims 30 and 31. (Canceled)

1 32. (Currently Once Amended) The cathode of claim 23, further comprising a
2 metal layer including nickel grains having sizes smaller than ~~[[the]]~~ sizes of grains in said
3 metal base, said metal layer being formed between said metal base and said electron-
4 emitting material layer.

1 33. (Currently Once Amended) The cathode of claim 32, ~~further comprised of~~
2 said metal layer further including at least one metal selected from the group consisting

3 essentially of aluminum (Al), tungsten (W), tantalum (Ta), chromium (Cr), magnesium
4 (Mg), silicon (Si) and zirconium (Zr) .

1 34. (Currently Once Amended) The cathode of claim 32, ~~further comprised of the~~
2 a thickness of said metal layer being in ~~[[the]]~~ a range of 1 to 30 μ m.

1 35. (New) A method of preparing a cathode for an electron tube, comprising the
2 steps of:

3 providing a metal base;
4 preparing a carbonate paste containing needle-shaped conductive material; and
5 coating the carbonate paste containing the needle-shaped conductive material onto
6 the metal base, and then drying to form an electron-emitting layer of the cathode.

1 36. (New) The method of claim 35, wherein the coating step includes applying
2 pressure on a coating layer in order to attain a desired level of surface roughness.

1 37. (New) The method of claim 36, wherein the step of applying the pressure on
2 the coating layer comprises at least one of printing, electrodeposition and painting.

1 38. (New) The method of claim 37, wherein the printing includes at least one of
2 screen printing and roll coating.

1 39. (New) The method of claim 35, wherein the coating step comprises coating to
2 a thickness in a range of 30 to 80 microns so as to obtain good electron emission
3 characteristics.

1 40. (New) The method of claim 35, said needle-shaped conductive material in the
2 electron-emitting material layer being in a range of 0.01 to 30% by weight based on a
3 total weight of said electron-emitting material.

1 41. (New) The method of claim 35, further comprising the step, between the
2 providing step and the coating step, of forming a metal layer on the metal base.

1 42. (New) The method of claim 41, wherein the metal layer comprises nickel and
2 a refractory metal to reinforce mechanical strength of the cathode.

1 43. (New) The method of claim 41, further comprising the step, prior to forming
2 the metal layer on the metal base, of mixing nickel powder and at least one of tungsten
3 and aluminum as a reducing agent to prepare a metal layer material.

1 44. (New) The method of claim 43, further comprising the step, after the mixing
2 step, of homogeneously mixing the metal layer material with an organic binder and a

3 liquid-phase organic solvent to prepare a paste which, when deposited on the metal base,
4 forms the metal layer on the metal base.

1 45. (New) The method of claim 41, wherein the forming step comprises applying
2 metal layer material to the metal base, and then thermally treating the applied metal layer
3 material in one of a vacuum and an inert gas atmosphere to obtain the metal layer without
4 organic matter.

1 46. (New) The method of claim 41, wherein the forming step comprises one of
2 printing, spraying, electrodeposition and painting.

1 47. (New) A cathode prepared by the method of claim 35.